

Performance Verification of Ship Ballast Water Treatment Technologies

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Ships use ballast water to provide stability during voyages and during loading and unloading operations. Water is taken on at one port when cargo is unloaded and usually discharged at another port when the ship receives cargo. Because sediments and/or organisms ranging in size from viruses and bacteria to fish living in the surrounding water are taken on board with ballast water, there is the potential for introduction of non-native organisms into the port of discharge. A number of methods to prevent these unwanted introductions are available; however, no single technique has been able to remove all organisms or all types of organisms from ballast tanks. A combination of methods may prove to be more effective than one method alone; however, little research on this has been conducted.

Under the U.S. Environmental Protection Agency's (USEPA) Environmental Technology Verification (ETV) Program, the USEPA and the U.S. Coast Guard (USCG) have initiated a joint effort to verify the performance of innovative technologies designed to control invasive species in ballast water discharges.

The ETV Program was designed to accelerate the development and commercialization of environmental technologies through third-party verification. The Program does not certify or endorse technologies, but rather provides objective, high-quality, peer-reviewed performance data that can be utilized by customer groups when selecting environmental technologies. The USCG is interested in developing testing protocols to support its efforts in establishing ballast water treatment standards and certification of treatment systems that will be used solely or to augment the current practice of open-water ballast exchange. The USEPA's interest includes the ecological, economic, and public health risks of ballast water discharges.

As part of the ETV process, a stakeholder group has prioritized a number of technologies to pursue under the Program. These technologies include hydrocyclonic separation followed by UV, ozonation, filtration, chemical biosides, ultrasonics, thermal treatment, and ballast water exchange. To date, a protocol has been designed to verify the performance characteristics of commercial-ready treatment technologies with regard to specific verification factors including biological treatment performance, predictability/ reliability, cost, environmental acceptability, and safety.

This poster will present a brief overview of the ETV Program and the status of ballast water treatment activities. It will also present details of the protocol, including the experimental design, the suite of surrogate organisms identified for the biological measurement program, and comparative studies to quantify the relative resistance to chemical/physical treatment.